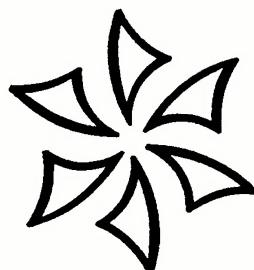


**ADCOM®**

**GFA-1, 1a**  
**AMPLIFIER**



**SERVICE MANUAL**

**ADCOM®**

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**GFA-1 Service Manual**

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**INTRODUCTION**

This manual provides the technical and service information required to perform all forms of maintenance to the GFA-1 and GFA-1a Power Amplifiers.

~~Section 1 contains the theoretical circuitry and test data for the GFA-1~~

SECTION 1  
CIRCUIT and THEORY

GENERAL DESCRIPTION

The ADCOM GFA-1 (and GFA-1a) Balanced Bridge Power Amplifiers are 2 pairs of true complementary-symmetric power amplifiers (4 amplifiers) mounted on a common chassis. Two of the four power amplifiers are driven out of phase as a pair of "bridging" amplifiers. This technique creates a balanced output from an un-balanced input. The amplifier employs input bandwidth limitation to control RF and T.I.M. related high-frequency aborations. The amplifier features a unique main-frame construction with a high efficiency forced-air cooling system. The 1a version incorporates an advanced protection technique offering "full coverage" electronic operating protection.

BRIDGING FOR POWER

Bridging two power amplifiers is an engineering technique which permits the combining of the safe operating aspects of a smaller amplifier with the power and price range of the high-fidelity amplifiers. Over power

and looking at the voltages that appear between the two outputs, we get the sum of the two outputs. This output is twice the voltage of either separate output. As the mathematics for power are a squared function, doubling the voltage means four times the power. Thus, the bridging configuration yields low-cost high power safely.

#### CIRCUIT DESCRIPTION

##### POWER AMPLIFIERS

Referring to the GFA-1a schematic (section 3) the amplifier operates as follows:

The incoming signal is DC decoupled by C1 with R1 and C3 providing frequency limiting and R.F. protection. This signal is then applied to the bases of Q1 and Q4 as one of the bridging signals and Q2 and Q3 for the other. Q1 and Q4 drive transistors Q5 and Q6 completing the voltage drive portion of the positive amplifier. These signals are then fed to the output stage made up of Q10, Q11, Q12, and Q13. This output section is biased and thermally tracked by the network made up of CR30 and Q16. Feedback from this positive amplifier is returned to Q1 and Q4 via resistor R24. This same signal via R25 is fed to Q2 and Q3 which form the input

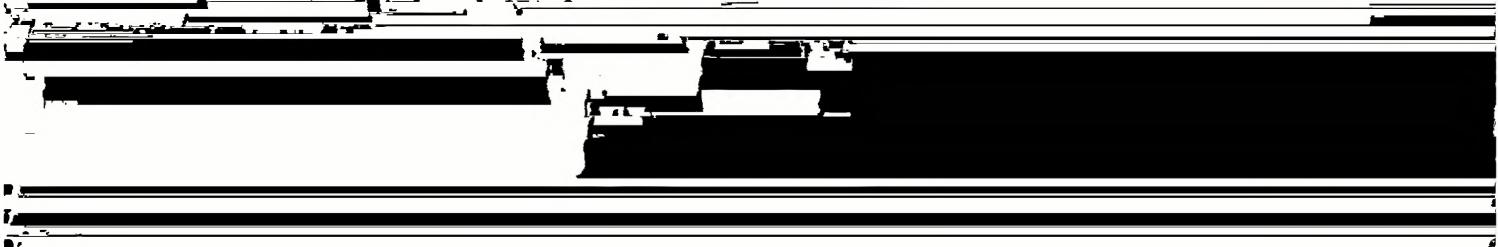
**POWER SUPPLY**

All power is provided by a common power transformer utilizing separate



SECTION 2  
SERVICE INFORMATION  
Test Set-Up

A-INTRODUCTION

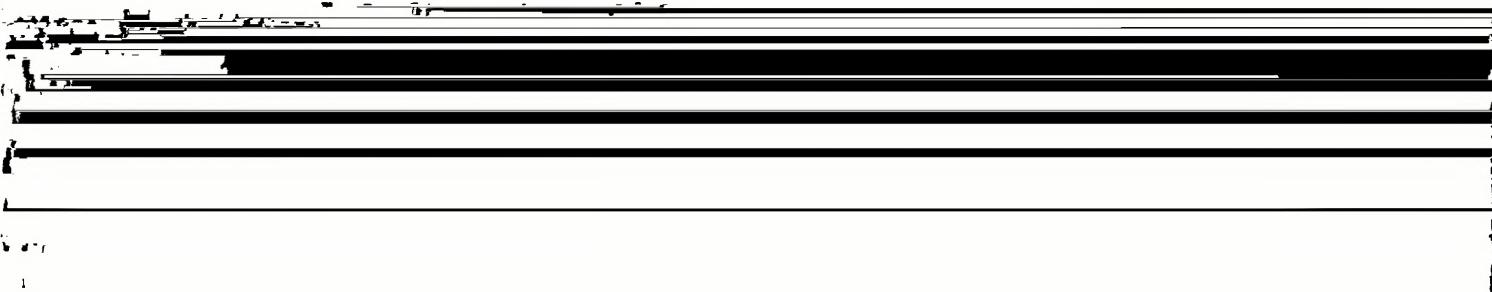


3. Audio generator- An unbalanced output audio generator with less than 0.002% T.H.D. over the frequency range of 20 Hz to 20 kHz at a 3 volt output level. We suggest the use of the generator portion of the Sound Technology 1701A.

4. Oscilloscope- Capable of balanced input and a vertical sensitivity of 30 mv. The unit should have triggered sweep and a 10 MegaHertz bandwidth.

5. Line Controller- A "Variac" type of main power line controller. Adjustable from 0 to 130 volts, this unit should have a 25 amp capability. As all IHF tests require a main voltage of 120 volts throughout the test, only a high quality controller with good high current line regulation should be used (Staco, General Electric, General Radio, Superior Electric, etc.).

6. Load- a fully isolated 8 ohm non-inductive load with less than 500 pfd intrinsic capacity. The load should be capable of dissipating over 400 watts and be connected to the power amplifier with at least #14 wire.



Attach the load to the output of the power amplifier. Make sure that the load has no connection with any other part of the test set-up. This means that the load has no "hot" and "ground" only a "+" and a "-". When operating in the "both channels driven" mode, ~~the two outputs are connected in series.~~

## DISASSEMBLY

Once the unit has been assessed as defective further service will require opening the unit. Place the GFA-1a on the bench in front of you with the POWER SWITCH end towards you.

Using a #6 phillips screwdriver follow these steps:

- a- Remove the 8 end screws.
- b- Remove the 10 screws around the edge of this end cap.
- c- Remove the 10 screws around the other end cap (this is the end with the speaker outputs).
- d- Slide off the end cap facing you (the one with the power switch).
- e- Slide the top cover piece out towards you and lift it away.

At this point the printed circuit board is fully accessable for voltage measurements.

## POWER TRANSISTOR REPLACEMENT

Once the unit has been opened and the fault mode assessed as including the failure of an output transistor, the following additional disassembly procedure must be followed:

- f- Remove the 6 side screws on the bottom cover (three on each side).
- g- Slide the bottom cover off.
- h- Carefully roll the unit over onto the printed circuit board.
- i- Remove the 4 standard screws securing the black power transformer.

Set the transformer to the right of the unit and remove the steel plate securing it.

j- Using a long phillips screwdriver, remove the four screws securing the power transistor covers and slide these covers out of the heat sink.

k- Remove and replace the appropriate power transistors.

After completing repairs reassemble the unit in reverse order. Be especially careful not to pinch wires or drop debris into the unit while reassembling.

## SECTION 3

**Operational Specifications**  
**(As per IHF A-202, 1978)**

1- CONTINUOUS AVERAGE POWER OUTPUT is the minimum power available over the frequency range of 20 Hertz to 20 kiloHertz at less than the rated distortion (IHF 3.1) this output level is 200 watts per channel into 8 ohms and 350 watts per channel at 4 ohms.

2- DYNAMIC HEADROOM is the ratio between the power at 3% THD and the continuous power noted in step 1 at 1 kiloHertz (IHF 3.2.3) and is 1.3 dB.

3- FREQUENCY RESPONSE is the change in output compared to the input with a frequency of 1 kiloHertz as the "0" reference ponint (IHF 3.13.1) and is +, -0.25 dB from 20 Hertz to 20 kiloHertz at 200 watts, both channels driven, onto 8 ohm loads.

4- SENSITIVITY is the input voltage required to produce an output of 1 watt into 8 ohms (2.83 volts RMS) (IHF 3.7) and is 72 millVolts RMS for a gain of 31.5 db.

5- "A" WEIGHTED SIGNAL TO NOISE RATIO is the ratio between a 1 watt into 8 ohm output signal level and the output when the input has no signal and in terminated with a 1 kilohm resistor. The noise is filtered through a standard "A" type network (IHF 3.12.2) and is 90 db.

6- LOW FREQUENCY DAMPING FACTOR is the ratio between an 8 ohm load and the 50 Hertz output impedance (IHF 3.11.2) and is 60.

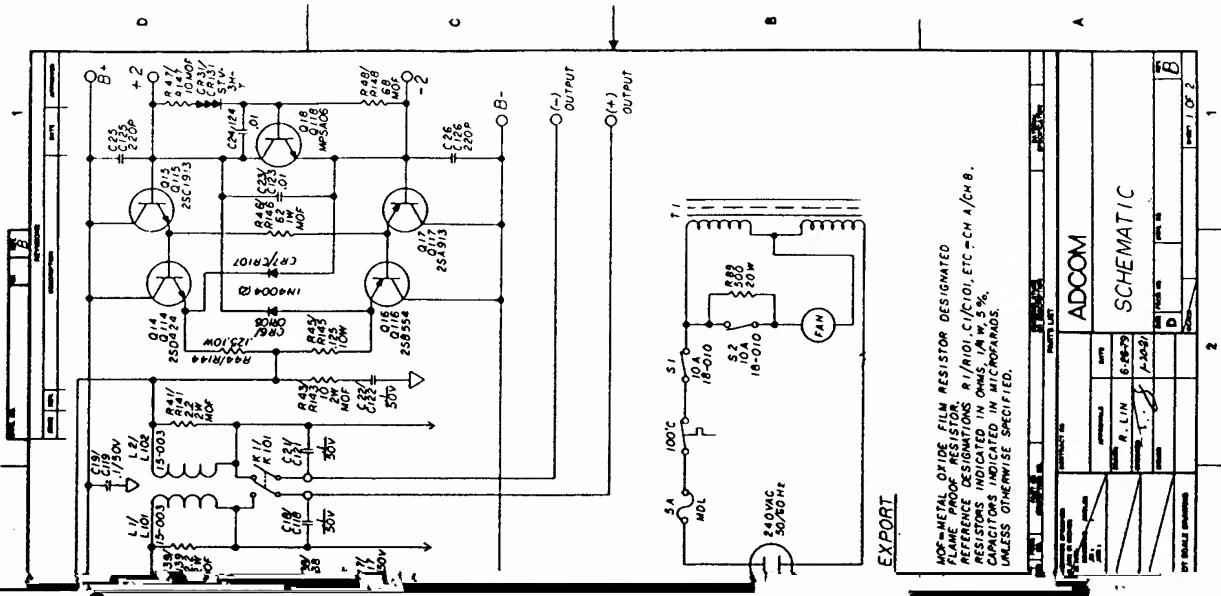
7- CROSSTALK is the ratio of the worst cross channel leakage over a range of 100 Hertz to 10 kiloHertz (IHF 3.14.1) and is 50 dB at 10 kiloHertz.

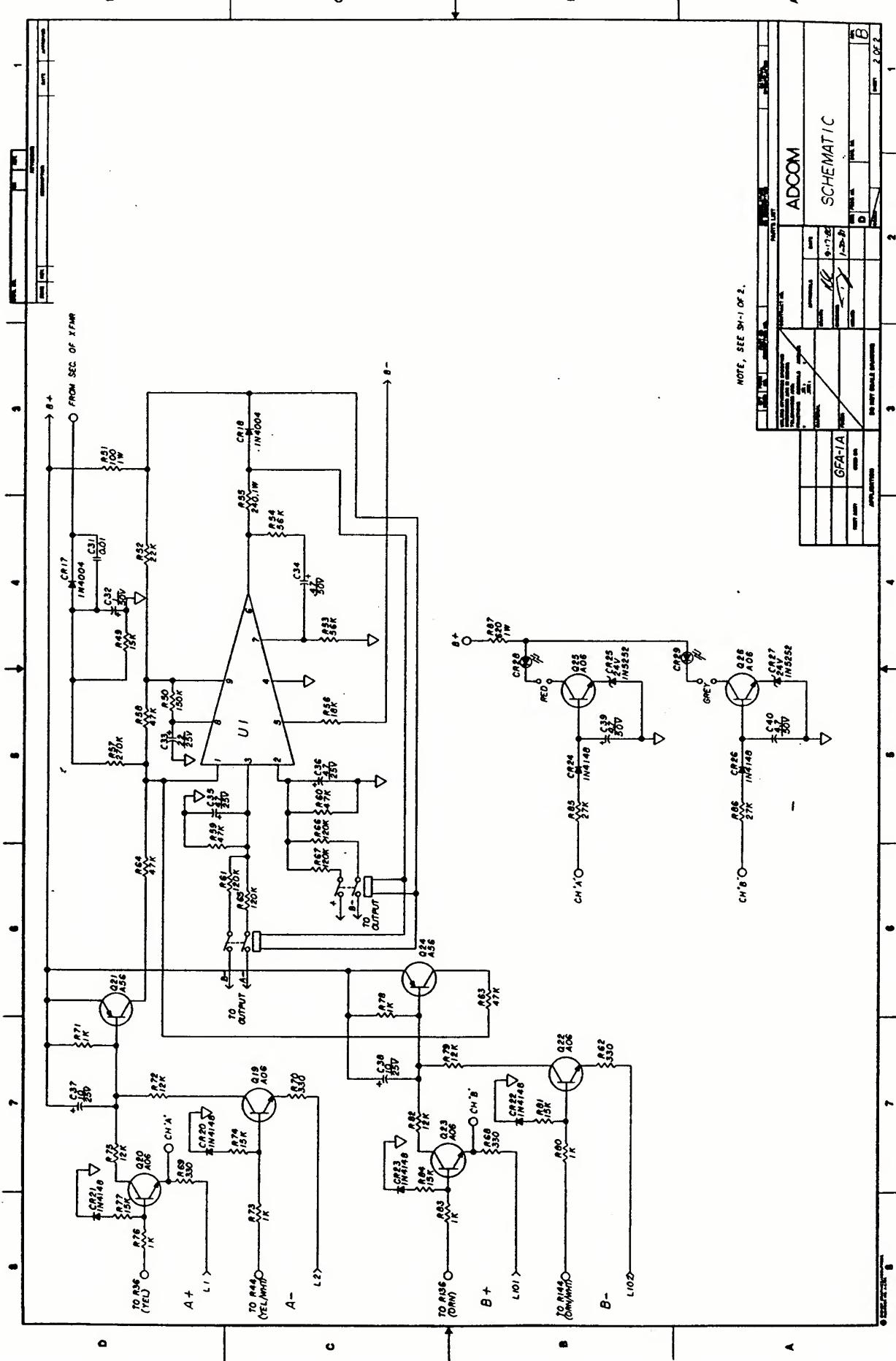
8- SMPTE INTERMODULATION DISTORTION is the distortion resulting from the amplification of a signal consisting of a 4 to 1 mixture of 60 Hertz and 7 kiloHertz (IHF 1.18 and 3.15.4) and is less than 0.1% at an output level of 200 watts into 8 ohms.

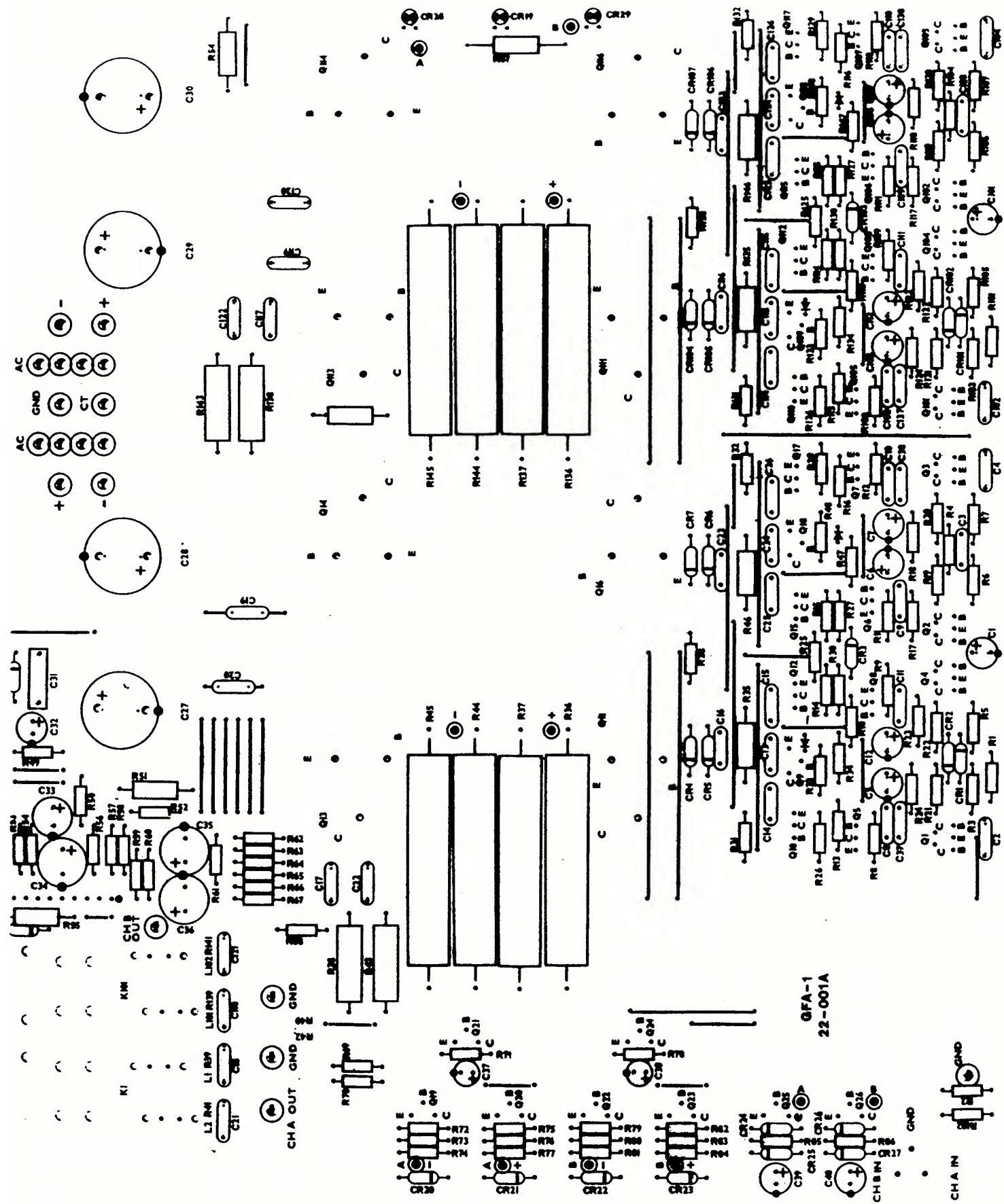
SECTION 4

SCHEMATIC DIAGRAM WITH VOLTAGES

ADCOM GFA-1a









MODEL GFA-1a

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SM 22-001-A

ASSEM. DESC. PC ASSEMBLY

ART NO	QTY	DESCRIPTION	REF. DESIG.
01-003-2	6	R: 2KOHM 2% 1/2W CF	
01-002-2	16	R: 1KOHM 2% 1/2W CF	
01-010-2	8	R: 39KOHM 2% 1/2W CF	
01-005-2	8	R: 10KOHM 2% 1/2W CF	
01-009-2M	8	R: 1.2KOHM 2% 1/2W CF-M	
01-008	12	R: 68 OHM 5% 1/2W MOF	
01-004-2	4	R: 3.3KOHM 2% 1/2W CF	
01-013	8	R: 10 OHM 5% 1/2W MOF	
01-006	2	R: 330 KOHM 5% 1/2W CF	
01-040	2	R: 27 KOHM 5% 1/2W MOF	
01-016	5	R: 15 KOHM 5% 1/2W CF	
01-011	6	R: 1 KOHM 5% 1/2W MOF	
01-017	4	R: 12 KOHM 5% 1/2W CF	
01-018	4	R: 330 OHM 5% 1/2W MOF	
01-019	4	R: 120 KOHM 5% 1/2W CF	
01-020	5	R: 47 KOHM 5% 1/2W CF	
01-021	1	R: 270 KOHM 5% 1/2W CF	
01-022	1	R: 18 KOHM 5% 1/2W CF	
01-023	1	R: 150 KOHM 5% 1/2W CF	
01-024	1	R: 22 KOHM 5% 1/2W CF	
01-025	2	R: 56 KOHM 5% 1/2W CF	
03-001	1	R: 10 OHM 5% 1/2W MOF	
03-002	1	R: 240 OHM 5% 1/2W MOF	
04-011	1	R: 620 OHM 5% 1W MOF	
04-002	4	R: 62 OHM 5% 1W MOF	
04-004	4	R: 10 OHM 5% 2W MOF	
04-007	1	R: 100 OHM 5% 1W MOF	
04-003	1	R: 3.9 KOHM 5% 1W MOF	
04-005	4	R: 2.2 OHM 5% 2W MOF	
04-006	8	D: 125 OHM 10% 10W T.M.	

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PART NO QTY		ASSEM. DESC.	PC ASSEMBLY	REF. DESIG.	
07-006	12	C: .1 MF + 80 100v GPC			
07-004	4	C: 10PF 10% GPC			
07-003	8	C: 47PF 10% GPC			
07-001	10	C: 220PF 10% GPC			
07-002	9	C: .01MF +80 100v GPC			
08-006	4	C: MY .1MF 100V RA DIP			
09-002	6	C: EL 100MF 10v RA			
09-001	4	C: EL 10 MF 50V RA			
09-004	2	C: EL 4.7 MF 50V RA			
09-006	2	C: EL 47 MF 16V RA			
09-007	1	C: EL .47 MF 50V RA			
09-008	1	C: EL 1MF 50V RA			
09-009	1	C: EL 22 MF 16V RA			
09-010	2	C: EL 10 MF 25V RA			
09-005	4	C: EL 8200 MF 63V RA			
11-002	10	DL: IN 4004			
11-005	2	DL: IN 5262 B 51V 5% ZEN			
11-003	10	DL: IN 4148			
11-018	2	DL: IN 5252 B 24V 5% ZEN			
11-007	6	TR: MPS A06 NPN			
11-006	2	TR: MPS A56 PNP			
11-009	4	TR: 2SA798			
11-010	4	TR: 2SC1583			
11-013	4	TR: 2SA914			
11-012	4	TR: 2SC1953			
11-019	1	IC: TA7317-P			
11-022	4	TR: MPS A06 SEL (Beta 70-120)			
12-003	2	RELAY: FRL264 D048/02CK			

ODEL GFA-1a

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22-001-A

ASSEM. DESC. E

PC ASSEMBLY

PART NO	QTY	DESCRIPTION	REF. DESIG.
15-003	4	CHOKE: OUTPUT	
17-006-A	1	PC BD: MAIN (GFA-1a)	
18-005	8	SOCKET: TR EMUDEN M 1629	
18-006	1	JACK: EMUDEN 5526	
18-004	1	LUG: #6 SOLDER	
18-018	8	LUG: $\frac{1}{4}$ " PUSH, CRIMP # 16 GA	
21-026	5	JUMPER: #22 GA SLD PVC .4"	
21-027	1	JUMPER: #22 GA SLD PVC .2"	
21-010	15	JUMPER: #22 GA SLD PVC BLK .5"	
21-012	7	JUMPER: #22 GA SLD PVC BLK .75"	
21-015	1	JUMPER: #22 GA SLD PVC BLK 1"	
21-013	8	JUMPER: #22 GA SLD PVC BLK 1.5"	
21-011	5	JUMPER: #22 GA SLD PVC BLK 2"	
21-008-06	6	WIRE: #16 GA STRD RED	
21-007-06	2	WIRE: #16 GA STRD GRY	
21-005-03	1	WIRE: #16 GA STRD BLK	
21-005-11	1	WIRE: #16 GA STRD BLK	
21-016-12	1	WIRE: #22 GA STRD RED	
21-017-12	1	WIRE: #22 GA STRD GRY	
21-018-12	1	WIRE: #22 GA STRD ORG	

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BM 50-003		ASSEM. DESC.	FINAL ASSEMBLY	
ART NO	QTY	DESCRIPTION		REF. DESIG.
04-010	1	R: 500 ohm 10% 20W WW		
11-016	2	DI: BRIDGE 25A		
11-014	4	TR: 2SB554 PNP (R)		
11-015	4	TR: 2SD424 NPN (R)		
11-020	4	TR: 2SA1111 PNP		
11-021	4	TR: 2SC2591 NPN		
11-017	4	DI: STV - 3H - Y		

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SMI	50-003	ASSEM. DESC.	FINAL ASSEMBLY
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PART NO	QTY	DESCRIPTION	REF. DESIG.
18-001	1	FUSE HOLDER: BUSS HKP	
18-002	1	RELIEF: HEYCO SR-5KN-4	
18-008	8	INS: TO-220	
18-007	1	TERM: SMK XQ 2754-01	
18-003	1	CONN: 10-18 GA WAT	
18-027	1	TERM: HHS-863	
18-020	8	INS: TO-3	
18-015	4	BUSHING: HEYCO B-187-125	
18-021	2	BUSHING: HEYCO SB-375-4	
19-007	4	FEET: 3M SJ-5023 BLK	
19-006	41	SCREW: 6-32 x $\frac{1}{4}$ REV PH BLK	
19-005	2	SCREW: #4 x 5/16 PH	
19-003	6	NUT: PRESS 10-32-2	
19-011	8	NUT: PRESS 4-40-2	
19-004	2	SCREW: 10-32 x $\frac{1}{4}$ PHSS BLK	
19-001	4	SCREW: 10-32 x 3/8 PH NP	
19-002	4	WASHER: #10 INT STAR ZP	
19-036	4	SCREW: 6-32 x 5/16 PH REV BLK	
19-025	4	STANDOFF: $\frac{1}{2}$ x 7/16 x 6-32 BR NP	
19-032	2	SCREW: 10-32 x 3/4 PH NP	
21-001	1	FAN: HOWARD	
21-002	9	TIE RAP: 3/4 DIA TY-23-M	
21-004	1	LINE CORD: C - 1248 MESS	

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SM	50-003	ASSEMBL DESC	FINAL ASSEMBLY		